

CLAIMS

I claim:

1 1. An apparatus comprising:
2 a memory;
3 a plurality of functional units that transfer data to and from the memory;
4 a crossbar that provides a data path from each unit to the memory, wherein the
5 crossbar comprises an arbitration unit to monitor data traffic generated by each of the
6 plurality of functional units through the crossbar and assigns a priority to each functional
7 unit based on the data traffic.

1 2. The apparatus defined in claim 1, wherein the arbitration unit monitors
2 data traffic from each functional unit by monitoring how often each functional unit
3 transfers data through the crossbar.

1 3. The apparatus defined in claim 1, wherein the arbitration unit monitors
2 data traffic from each functional unit by monitoring the type of data that each functional
3 unit transfers.

1 4. The apparatus defined in claim 1, wherein the arbitration unit uses a
2 programmable priority scheme and a fixed priority scheme.

1 5. The apparatus defined in claim 4 wherein the fixed priority scheme
2 comprises a round robin scheme that rotates the top priority designation among at least
3 some of the plurality of units.

1 6. The apparatus defined in claim 4 wherein the programmable priority
2 scheme makes changes based on actual traffic statistics.

1 7. The apparatus defined in claim 4 wherein the arbitration unit uses a
2 number of rotating slots, each programmed to assign priority to any one of the plurality of
3 functional units.

1 8. The apparatus defined in claim 7 wherein the arbitration unit grants access
2 to one functional unit if the one functional unit makes a request while the arbitration unit
3 indicates that the one functional unit is at one of the number of rotating slots having a
4 highest priority.

1 9. The apparatus defined in claim 8 wherein the arbitration unit only grants
2 access if all necessary resources requested by the one functional unit are available.

1 10. The apparatus defined in claim 8 wherein the arbitration unit increments a
2 slot count to change the highest priority to another of the rotating slots after granting
3 access to the one functional unit.

1 11. The apparatus defined in claim 8 wherein the arbitration unit uses the
2 fixed priority scheme to grant access to one of the plurality of functional units when the
3 one functional unit makes a request, is not assigned to a slot with the highest priority, and
4 a functional unit with the highest priority is not making a request or a desired resource of
5 the functional unit with the highest priority is not available.

1 12. The apparatus defined in claim 1 further comprising:
2 a central processing unit (CPU); and
3 an access bus coupled to the CPU and plurality of functional units, the access has
4 being independent of the data path.

1 13. The apparatus defined in claim 1 wherein one of the plurality of functional
2 units comprises another crossbar.

1 14. The apparatus defined in claim 1 wherein the arbitration unit further
2 comprises a direct memory access (DMA) port request unit that allows access priorities
3 to the memory to be programmably defined.

1 15. The apparatus defined in claim 1 wherein the arbitration unit further
2 comprises statistics registers that indicate usage of the data paths.

1 16. The apparatus defined in claim 15 wherein the statistics registers store a
2 count of the number of data transfers through the crossbar.

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1 17. The apparatus defined in claim 15 wherein the arbitration unit dynamically
2 adjusts the priority assigned to each functional unit based on bandwidth demand requests
3 by each functional unit.

1 18. The apparatus defined in claim 15 wherein the arbitration unit dynamically
2 adjusts the priority assigned to each functional unit based on delays in getting requests
3 serviced.

1 19. A method for data transfer arbitration comprising:
2 monitoring data transfers for a plurality of devices; and
3 assigning a priority to each device corresponding to the amount of data transfers
4 generated by the device.

1 20. An apparatus for data transfer arbitration comprising:
2 means for monitoring data transfers for a plurality of devices; and
3 means for assigning a priority to each device corresponding to the amount of data
4 transfers generated by the device.